



Natural Gas Vehicles: **An American Energy, Economic, and** **Environmental Answer** **LDEQ Green Business EXPO**

August 24, 2011



Compressed Natural Gas (CNG) - The Energy Answer!



- **CLEAN**

- Produces 93-95% less overall toxics and reduces greenhouse emissions by 20-30% compared to gasoline and diesel vehicles.

According to the **EPA**, natural gas is the cleanest-burning alternative transportation fuel commercially available today. A study performed on behalf of the California Energy Commission confirms the EPA's findings.

- **AMERICAN**

- 98% of the natural gas use is produced in North America. We purchase **70% of our oil** from foreign nations.
- 71%: Share of US oil consumption is from **transportation**

- **ABUNDANT**

- Natural gas reserves continue to be discovered and increase each year. The U.S. has enough natural gas to last for 120 years and beyond.

- **AFFORDABLE**

- CNG costs on average are over **40% less than** conventional gasoline at the pump.



Compressed Natural Gas (CNG) – The Energy Answer!



NATIONAL SECURITY

- The U.S. controls 4% of the world's oil reserves yet we consume 25% of the total global production
 - American producers control all of our needed natural gas reserves.

ENVIRONMENTAL

- 40 – 70% of emissions are from the transportation sector
 - Non-attainment will adversely affect economic stability.
 - Health problems created by transportation pollution will increase medical costs

In 2005, the vehicle sector produced \$56 billion in health and other non-climate-change damages

\$36 billion from light-duty vehicles and \$20 billion from heavy-duty vehicles.












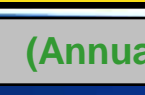
Converting **one refuse truck** from diesel to natural gas is the equivalent of taking **325 cars off the road** in terms of pollution reduction

Today's buses have 2010-compliant, **low-emission** natural gas engines, which produce only **one-sixth the smog-inducing NOX** that the latest “**clean diesel**” buses produce.

Natural gas buses demonstrate **diesel-like performance**, with a **90% reduction in noise**.

Compressed Natural Gas (CNG) – The Energy Answer!



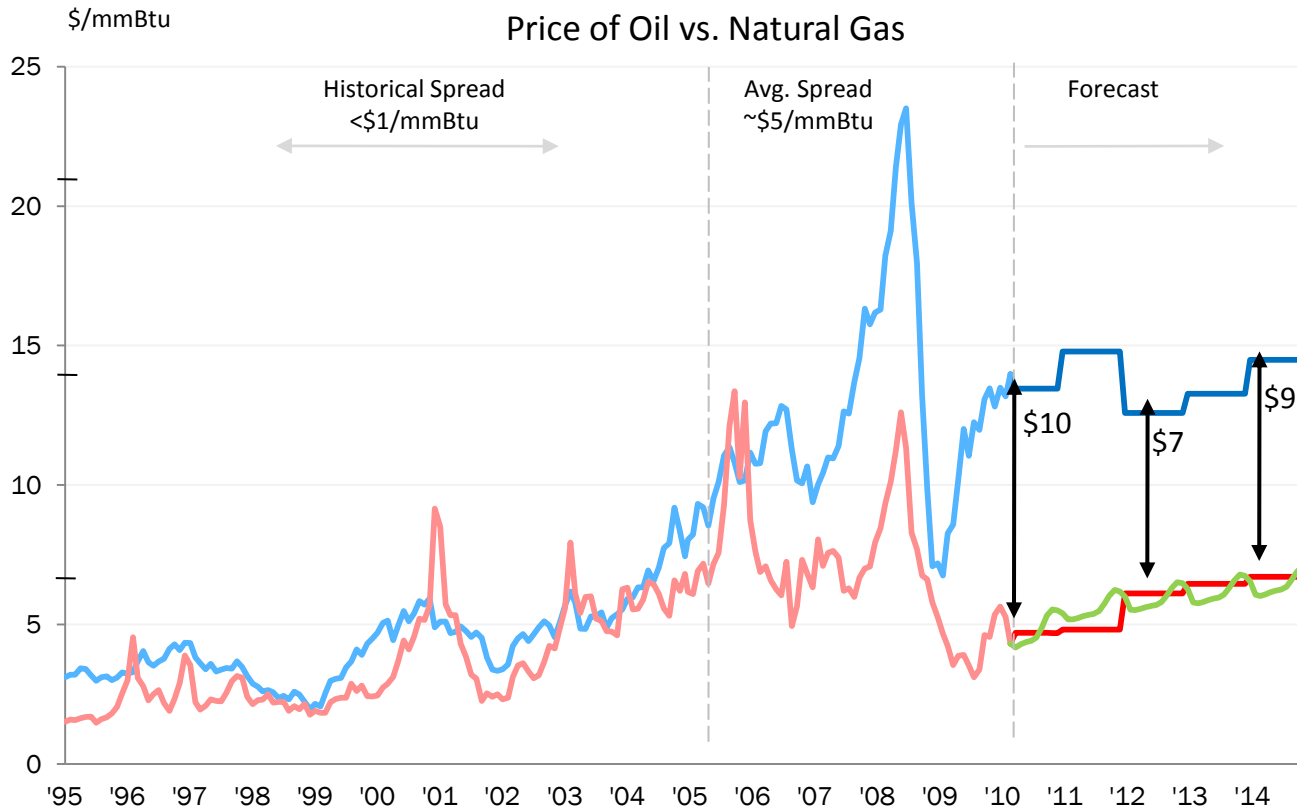
				CNG VEHICLES	STATIONS	NGVs / STATION
1	Argentina			1,650,000 (12%)	1,400	1,180
2	Pakistan			1,550,000 (54%)	1,606	965
3	Brazil			1,425,513 (26%)	1,442	988
4	Italy			432,900 (12%)	558	775
5	India			334,820 (34%)	321	1,043
6	Iran			263,662 (82%)	179	1,472
7	Colombia			203,292 (65%)	310	655
8	USA			146,876 (9%)	1,340	109
9	China			127,120 (24%)	355	358
10	Ukraine			100,000 (33%)	147	680

(Annual Growth Rates 2005 -2007)

Chesapeake
ENERGY

Growing Markets: **Germany, Sweden, Japan**

Compelling Case: CNG Price Stability



Source:

Henry Hub CERA Reference Case (Feb 2010/032510 Briefing), IHS Global Insight WTI June '09, CERA , NYMEX (as of 4/4/10)

- When NYMEX Mcf was **\$12.00**, commodity portion of CNG was **\$1.50/GGE**
- When NYMEX Mcf was **\$8.00**, commodity portion of CNG was **\$1.00/GGE**
- When NYMEX Mcf was **\$3.20**, commodity portion of CNG was **\$.40/GGE**

NGVs are a Fleet Owner's Dream

- » Local/State Governments
- » Airports
 - ▶ Terminal Buses, Shuttles, Taxis, Tarmac Vehicles
- » Refuse
 - ▶ Collection, Recycling
- » Transit
 - ▶ City Buses, Maintenance, Shuttles
- » School Districts
 - ▶ Buses, Vans, Maintenance
- » “Short Haul” Delivery
 - ▶ Food & Beverage Distributors, Postal, Newspapers, Linens, Uniforms, Regional Freight
- » Utilities & Telecom
 - ▶ Gas/Electric/Water, Communications
- » Small Businesses
 - ▶ Plumbers, Electricians, Florists, Service Companies
- » Energy Companies

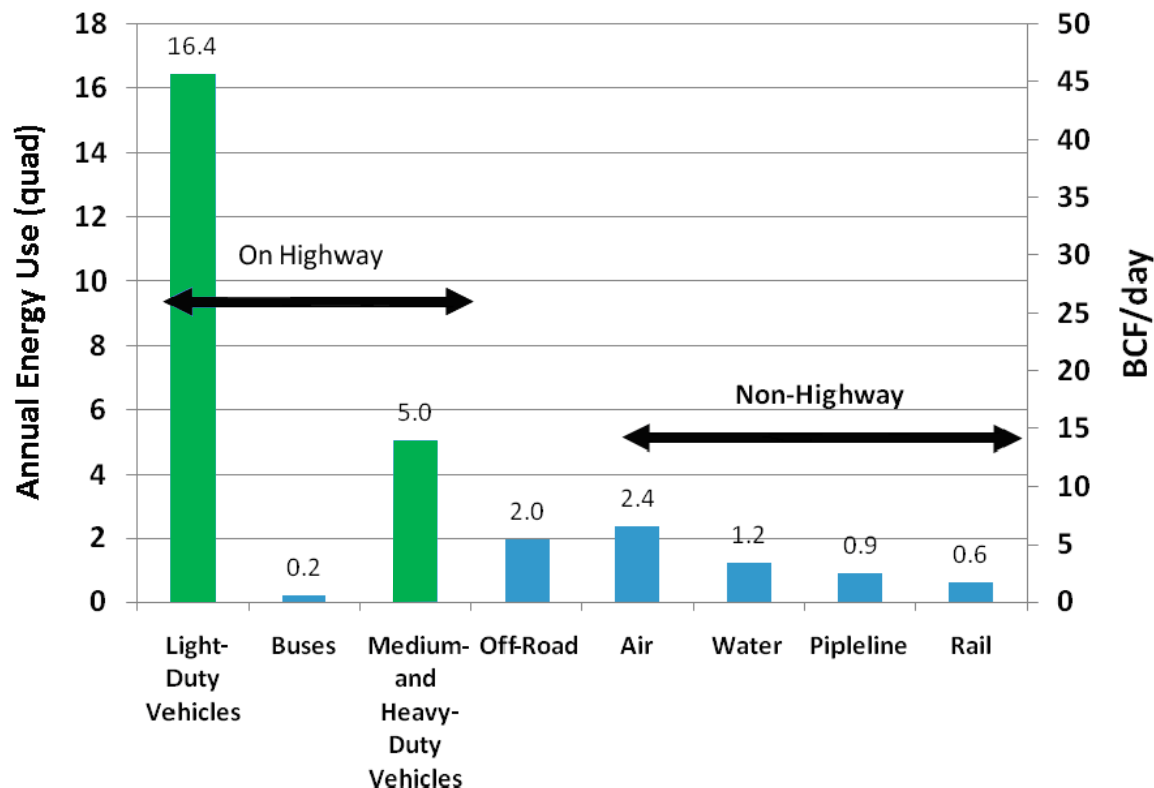


Fuel Consumption by Vehicle Type

Passenger and Light-Duty trucks dominate energy use.

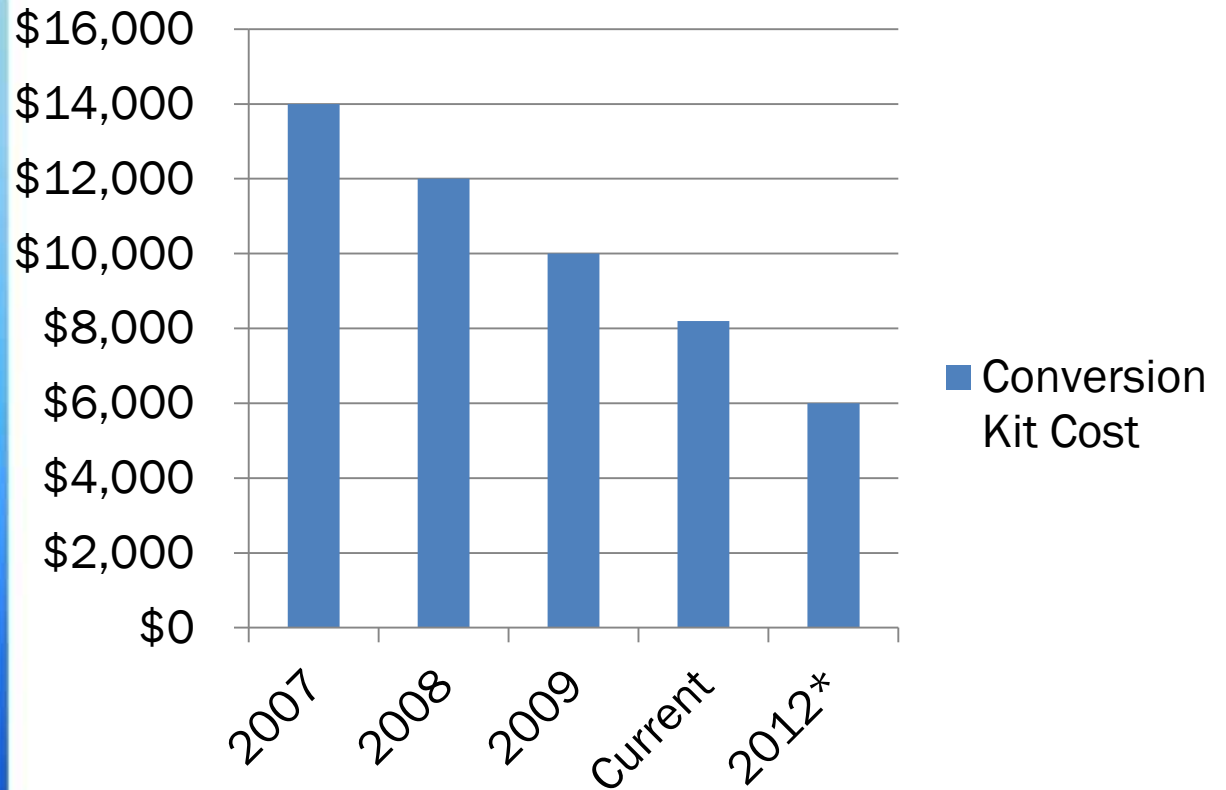
Medium and Heavy-Duty Vehicles consume large amounts of energy due to lower fuel efficiency.

Primary focus on the two largest energy users on the road: Approx. 60 BCF/day.



Source: TIAX Report : "U.S. and Canadian Natural Gas Vehicle Market Analysis," May 2, 2011

CNG Conversion Kit Affordability



*Goal for 2012 is \$6,000

Note: Cost excludes any State or Federal Tax Credits

Current Chesapeake Fleet



Vehicle Class	Unit Count
Light-Duty Truck (less than 10,000 lbs.)	4,197
SUV	338
Straight Truck	3
Medium-Duty Truck	197
Cargo Van	33
Passenger Car	13
Total Unit Count*	4,781

*excludes HD trucks, specialty vehicles, misc. equipment, and trailers



Fleet Overview

- **88%** Light Duty Trucks and SUVs
- Over **100 Million** Miles Driven Annually
- Over **\$25.4 Million** Annual Fuel Spend



Projected Annual Fuel Savings

CNG Fuel Savings Model Assumptions:

» CHK Vehicle travels 30,000 miles per year

► Avg. life of CHK vehicle is 3 years

» Annual gasoline consumption per vehicle - 2,310 gallons (13mpg)



Annual CNG Savings Per Vehicle

Utilization (%)	80%/Fuel Savings	85%	90%
2,310	1,850 GGE	1,960 GGE	2,080 GGE
\$1.00	\$1,850	\$1,960	\$2,080
\$ 1.50	\$2,775	\$2,940	\$3,120
\$ 2.00	\$3,700	\$3,920	\$4,160
\$ 2.50 OK Savings Today	\$4,625	\$4,900	\$5,200

*Numbers shown above are rounded estimates

NGV Facts



- Bi-fuel vehicle, meaning that it runs on both gasoline and natural gas.
- Capacity and range for a Silverado:
 - CNG Capacity = **21 Gas Gasoline Equivalent (GGE)**
 - CNG Range = approximately 280 miles
 - Please note: the gasoline capacity and gasoline range are the same as a Silverado that has not been converted to CNG.
- NGV's have the same **horsepower** and acceleration compared to their diesel and gasoline counterparts.

Vehicle Safety



- NGV's are not only safe, they are actually safer than gasoline vehicles.
- The CNG tanks are safely mounted in the bed of the truck or underneath and vehicle.
- CNG is lighter than air therefore, it just dissipates into the atmosphere.
- Gasoline is $\frac{1}{2}$ the ignition point of CNG, which makes CNG safer.
- The CNG tank is tested up to 18,000 PSI and the tank is actually strongest structure on the vehicle.
- EPA certification/OCCC/Impco

Louisiana's Leadership – Paving the Way for Clean Natural Gas Vehicles

Empowering America



● Act 469

- CNG legislation personal income tax credit of 50% for conversion equipment on vehicles
- 50% credit on fueling infrastructure
- Increases income tax credit to \$3000 for purchase of dedicated vehicles.



This landmark legislation will be an adrenaline shot to the market in Louisiana – propelling Louisiana to a leading clean energy state



Natural Gas Demand Impacts: Delivery Vans

Empowering America



- GVWR: **>8,500 <14,000**
 - Ford E-350 passenger van
 - Chevy/GMC 3500 passenger van
- MPG: **13/15 City/Highway**
- Fuel Use: 9-12 gge/day; 4,100-4,500 gge/year
- CNG Premium: **\$15,500** (before tax credits)
- State Tax Credit: **\$7,750**
- Simple Payback: **1.1 – 1.3 years** (Based on \$1.50/gge savings at retail station)
- Life-Cycle cost advantage: **\$18,000 – \$23,000**
(Depending on use and miles per day, cost differential)



Natural Gas Demand Impacts: Refuse Application



- **GVWR: >26,000 lbs**
ESI 7.6L Engine
International/Peterbuilt
- **MPG: 2.5 - 3.0**
- **Fuel Use: 35-40 gge/day;**
8,500-10,000 gge/year
- **CNG Premium: \$50,000**
- **State Tax Credit:**
- **Simple Payback: 3.2 – 4.0 years**
- **Life-Cycle cost advantage: \$80,000 – \$100,000**
(Based on 8-year life cycle)



Fuel Infrastructure is Vital

- Light duty and medium duty vehicles
- Same fuel that heats homes & used for cooking
- Pipeline gas compressed at the station
- Dispensed similar to gasoline
- Stored in cylinders onboard vehicle
- Not propane! (NG has higher BTU content)



Clean Energy
ENERGY

Estimated Sample Prices

How Much Does a CNG Station Cost?



Qty	Components & Construction Costs	Total Price
1	125 HP Compression Module	\$213,000
1	Compressor Enclosure	\$35,000
1	Priority Panel	Included
1	Natural Gas Dryer	\$46,000
3	ASME Storage Tubes – Skid Mounted	\$148,000
1	2 Hose Dispenser w/ Card Reader & Printer	\$58,000
1	Auto Dialer for Shutdown	Included
1	Motor Soft Start & Other Misc.	Included
		\$500,000
1	Construction – Canopy, Concrete, Trenching	Included
1	Electrical	Included
1	Compression – Engineering & Mechanical	Included
1	Dispensing	Included
	* Based upon recent CNG equipment price averages	\$150,000

Federal Funding Opportunities

- ARRA Stimulus Funding
- Clean Cities
- EPA Supplemental Environmental Projects
- FTA & FHWA CMAQ Funding
- U.S. EPA Diesel Emission Reduction Act Funding (includes Clean School Bus Program)
- Earmarks – federal appropriations legislation

CNG in Louisiana-



- Shreveport/Bossier area—9 with-in 8 months
- Alexandria—November
- Chatham
- Lafayette—2 with-in 8 months
- Baton Rouge—4
- New Orleans—1 with-in 6 months

“Phill” is Right at Home



- Using the home refueling station, fuel costs drop to approximately 60% of gasoline
- State and federal tax credits can offset or even completely cover the initial purchase price.
- **Benefits:**
 - Convenient – re-fuels a typical compact car overnight.
 - Quiet – produces no more noise than an air-conditioning unit.
 - Economical – uses no more electricity than an average small appliance.
 - Flexible – easily mountable inside or outside a garage.

NATURAL GAS VEHICLES MEAN MORE

AMERICAN

JOBS AND A STRONGER ECONOMY



Natural gas vehicle adoption will not only create jobs and stimulate the economy – but using NGVs will directly reduce the U.S. net deficit because it will reduce our importation of foreign oil.



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